

Higher Physics: Revision
18th December 2017

Supplemental answers

Recording time: 1:05:22

Q1 a) Calculate angle Q

$$n = 1.33 = \frac{\sin \theta_{air}}{\sin \theta_{water}} = \frac{\sin \theta_{air}}{\sin 40}$$

$$\sin \theta_{air} = 1.33 \times \sin 40$$

$$\theta_{air} = 59^\circ$$

b) Calculate the critical angle for the light in water.

$$n = \frac{1}{\sin C}$$

$$\sin C = \frac{1}{1.33}$$

$$C = 49^\circ$$

c) Calculate the wavelength, in nm, of the light in air.

$$\text{error on slide} = 4 \times 10^{14} \text{ Hz}$$

$$v = f \times \lambda$$

$$3 \times 10^8 = 4 \times 10^{14} \times \lambda$$

$$\lambda = 7.50 \times 10^{-7} \text{ m}$$

d) Calculate the wavelength, in nm, of the light in the water.

$$n = \lambda_1 / \lambda_2$$

$$1.33 = 7.50 \times 10^{-7} / \lambda_2$$

$$\lambda_2 = 5.64 \times 10^{-7} \text{ m}$$

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Recording time: 1:05:40

Q 2) What is the refractive index of ice?

- a) 1.13
- b) 1.19
- c) 1.31 ✓
- d) 1.56
- e) 2.00

$$n = \frac{1}{\sin C}$$

$$n = \frac{1}{\sin 50}$$

$$n = 50$$